Logistics Management Institute

A Database for Decision-Making in Training and Distributed Learning Technology

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LMI

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Executive Summary

The Under Secretary of Defense for Personnel and Readiness (USD[P&R]) has oversight responsibility for the military's huge institutional training base and is responsible for advising the Secretary of Defense on resource- and readiness-related issues. With the annual training budget running at $14 billion, the office of the USD(P&R) is concerned with ways to achieve training at lower cost while maintaining or improving effectiveness. Technological improvements of the 1990s, such as the Internet, offer great potential to reduce the costs and improve the quality of training. The Under Secretary has focused sharply on encouraging the military services to exploit this technology in training.

To support the transition to increased technology, LMI constructed a database encompassing the services' and DoD's institutional skill training courses—over 30,000 courses.[1] Among other things, this database is useful in identifying institutional training courses for distributed learning conversion or other possible cost-saving changes. Initial questions we posed to the database included the following: Which institutional courses offered by the Marine Corps, Air Force, Navy, and DoD are similar to distributed learning courses planned by the Army? Can we group courses together to create consolidated "high-load" courses, and to what extent can we say it would make sense to use technology in high-load courses? Which courses use a form of "distributed learning" already? Which courses are the best candidates for distributed learning? The information needed to address these questions was incorporated into the database and many such questions were answered.

As P&R's distributed learning initiatives continue to develop, the database can be useful for answering staffing questions and planning transitions to technology-assisted courses. The database already can provide some information to help decide where priorities lie. The database can describe which course subjects are most frequently offered in schoolhouse training; how geographically dispersed the training is; and whether enlisted personnel, officers, or other people comprise the

[1] Institutional training refers to the traditional classroom lecture instruction method, delivered in a dedicated school facility, rather than on the job site.

majority of students. The database can reveal which courses are most often taken by pilots, by medical students, and by other career choices, and how long the coursework takes. In the current state of high utilization of certain military specialties such as pilots, this database could begin to identify and quantify ways to reduce hours associated with training and increase the availability of pilots for duty. As budget planners examine base realignment and closings, this database can help illustrate where alternative schoolhouse training is available and where it could be lacking.

Policy and budget questions that are likely to arise could be addressed, at least partly, with the assistance of the database. In transitioning to a distributed learning curriculum, planning questions will need to be addressed by data. Some additional data collection and effort may be needed for an expanded database use. Questions decision-makers may raise that would require additional data include these: What are the year-to-year trends for teaching particular subjects or courses? How many service members are in training on a given day? Which courses are most instructor-intensive? How many instructors have been used in the past, and how many instructor days are planned for the current year? How many courses are currently taught by contractors? How effective is distributed learning? How much schoolhouse teaching always will be necessary and why?

The major elements of information that senior managers need to know in planning distributed training are the cornerstone of the database. A significant amount of information has been compiled in this database, enabling it to answer specific training-related questions: how much goes on where? with whom? to what end? With additional budget-related data, the database could be a powerful informational tool for P&R, answering real-time budget questions.

We recommend that additional information be collected that training managers and staff planners need to know in transitioning to a distributed learning curriculum. Trainers need to know what distributed learning courses and courseware are available now, or are being put together collaboratively, and who future collaborators will be. In order to invest wisely in distributed learning, all planners need to know the relative effectiveness and costs of distributed learning curricula in comparison to traditional methods. To develop a military-wide distributed learning plan, the existing course database must be enhanced with information about resource use to more accurately target the greatest areas of need.

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Distributed Learning Training Potential

INTRODUCTION

Advanced distributed learning is an exciting development in the field of training, with the potential to improve the amount learned from training, shorten training time, and provide on-the-job just-in-time training for highly technical fields. The capacity for sharing courseware and educating the workforce is enormous and is enabled in large part by electronic developments of the past few years.

Distributed learning is the process of disseminating learning or instruction to numerous locations. The distribution can be synchronous (at the same time) or asynchronous. One example of synchronous distributed learning is videoteleconferencing, where one instructor is seen in a number of classrooms. One subset of distributed learning is distance learning, which usually implies distributed learning over a large geographic distance. Distance learning can also be synchronous or asynchronous. An example of asynchronous learning is the recording of instruction material on a CD-ROM, which is viewed by students some time after the instructor recorded the material.

This project began as an analysis and databasing of institutional training classes to determine those courses ripe for consolidation or conversion by comparing with selected Army Distance Learning Plan courses. This comparison process will be explained further in the analysis section. The domain for comparison has expanded to comparisons among all the services' training courses, other agencies' training courses, and commercial courses. Additionally, the comparison has grown from matching similar courses to matching parts of courses in order to reuse expensive technological media.

This report discusses the application of distributed learning technologies to institutional military training. The paper proceeds in three chapters. The first chapter discusses distributed learning technology. Chapter 2 describes the military training database that was developed to begin to prioritize the transition from institutional training to distributed learning and how it could be expanded and further used in planning a transition for all military services. It should be understood that the database is complete as far as the purposes for which it was compiled, but that it is like a house that begs expansion, and it could use "home improvements" in some completed areas as well. Chapter 3 discusses the need for return on investment (ROI) information from distance learning conversion, and why ROI information is difficult to quantify and apply. Chapter 4 makes recommendations: the accomplishment of a self-subscribing distributed learning courseware network on

the Internet, a study on ROI, and analyses of the effectiveness of distributed learning training for the students.

The need for assessing implementation costs and training effectiveness gained is foreseen; so a study plan is proposed to begin to gather payback and training retention data to be included on a recommended electronic forum.

WHAT ARE ADVANCED LEARNING TECHNOLOGIES?

Training managers throughout the public and private sectors are implementing a wide variety of advanced learning technologies, ranging from multimillion dollar simulations to computer and video teletraining. Virtual reality, computer-based instruction, CD-ROM instruction, Web-based correspondence courses, electronic submittal of homework and electronic grading, automated self-testing quizzes, and infinitely repeatable computer simulation sessions are among the new technologies available for enhancing training and learning. These technologies are the next generation of multimedia use in instruction, a logical extension of training films, slides, and audio recordings; but also create a new capability of more realistic instruction through simulation. These technologies can be inserted into existing lecture lessons or used to supplant them entirely.

Perhaps the most innovative of new technologies are distributed learning technologies. Distance learning is the accomplishment of training or education when the instructor and student are geographically separated; often in distributed learning they are also asynchronous, in that the teacher creates instruction and the student receives instruction at separate times.

WHY IS DISTRIBUTED LEARNING IMPORTANT?

Distributed learning creates cost savings by eliminating or reducing the facilities and travel costs of geographic collocation and raising the student-to-instructor ratio without degrading instructional effectiveness. Distributed learning shows great promise in maintaining or improving proficiency and reducing cost, although these qualities are difficult to measure, and a definitive measuring of savings for the military has yet to be made.

Distributed learning technologies also hold the promise of "just-in-time" training, important particularly in technical fields where the volume of information to be absorbed cannot be obtained without extended and recurring training. The alternative to these time-intensive training needs is training on just the topic needed, at the time the topic is needed. For example, an aircraft mechanic who needs to test for fatigue on a particular part on a specific aircraft can access the lesson on that procedure on the day he or she needs the knowledge, rather than trying to learn all possible repair and test procedures for all aircraft and then refresh that knowledge annually. Just-in-time training transforms technical knowledge into on-the-job

training, which reduces the amount of time technicians need to spend in training and increases the amount of time spent on the job.

WHERE IS DOD ON THE DEVELOPMENT CURVE?

One of the largest training organizations in the country, the U.S. military services, offer only isolated distributed learning courses. Only one service, the Army, has a formal plan to transition to distributed learning in training. The Army currently has several initiatives underway, including the following: the Army Distance Learning Plan, which lists 525 courses to convert; installation of electronic classrooms at bases across the nation; and improvements in the Defense Information System Network (DISN) to handle distributed learning data traffic. Trainers at Fort Knox and possibly other installations have converted individual courses according to their own needs, not as part of the Army plan.

The Marine Corps plans a telecommunications upgrade and plans course-by-course conversion at the Marine Corps Institute. The Air Force is in a multiyear process to develop a distributed learning program. The Air Force currently uses interactive videoteletraining at Maxwell, Shepherd, and McGhee Tyson Air Force Bases, using the Army data backbone; and CD-ROM development is going on at Shepherd, Lacklund, Maxwell, and Gunter Air Force Bases.

The Navy has a program objective memoranda outlining a positive approach to distributed learning, has developed several courses, and is using distributed learning shipboard through Shipboard Training Education Advancement Morale (STEAM). STEAM is a multi-purpose distribution system that includes Programs for Afloat College Education (PACE), Shipboard Training Enhancement Program (STEP), and several other programs including morale-builders. The Navy announced plans to convert six courses a year in the area of developmental skill training and has developed and offers a course for authoring distributed learning called the Navy Interactive Courseware Novice Authoring Course (NICNAC). The Navy Reserves have a common backbone in place, running Lotus Notes and called "R-Net." The Navy plans to share the Marine common hardware suite and Army bases' distributed learning classrooms.

In short, the services are just getting going on the development curve. The Navy and Army have 2 or more years of development behind them, but the Air Force and Marines are just now getting started. There is a lot going on outside DoD for the services to share or borrow.

Distributed learning already has begun to revolutionize both education and training. The Federal Acquisition Institute and the Defense Acquisition University offer nearly entire curriculums through distributed learning. Several other universities around the country have begun to use distributed learning, including voca-

tional schools, undergraduate institutions, and graduate schools.[1] Large corporations including Boeing, Xerox, and Lockheed Martin were early implementers of just-in-time and on-demand training. In time, it can be predicted that the application of training technologies will broaden the audience and lower the cost of education and training. Training and education will be more accessible to more people throughout their lives. Just as the Internet has transformed libraries from book depositories to linked information centers serving a broad variety of media, advanced training technologies will transform schools and universities into access ramps for lifelong learning across unlimited fields of knowledge.

However, distributed learning is still the exception rather than the mode or even a large percentage of offered training. Many university colleges have no distributed learning courses. The majority of people who receive advanced education and training do so early in their career from schoolhouse-based instruction. Many instructors fear distributed learning for its potential for misapplication and lack of instructor involvement.

Presently, each of the above-mentioned practitioners offers its expertise to a limited market; there is no national clearinghouse of distributed learning information. Information on existing distributed learning or training technologies often is found through Internet searches or attendance at professional conferences. The search for an already developed training course by existing practitioners could take months. Encouragement of the intervening steps between where we are now and the vision of just-in-time training for everyone is discussed in this report. We begin with the potential for converting some of the 30,000-plus institutional courses offered by the armed services. Some have obvious cost savings potential due to avoided travel. Many courses could be shared with corporate America and other civilian government agencies.

How Can Distributed Learning Technologies Be Applied for the Services?

Most military recruits receive an exhaustive education in performance of a particular vocation shortly after boot camp. The training is given at Initial Skill Training; then, the recruit joins his/her unit, where a tiny percentage of the knowledge just learned is put to use.[2] The recruit may have received training sufficient to become, say, a certified auto mechanic, but on arrival at his/her unit, he or she is initially given less demanding tasks, such as routine maintenance. At some point in the future, the recruit needs to move on to the next skill level, and at that

[1] Distributed learning is known to be offered in undergraduate degree programs at National Louis University and Florida State University. Graduate degree programs incorporating distributed learning include Virginia Tech, George Mason University, Johns Hopkins University, Virginia Commonwealth University, University of Maryland, and many others.

[2] Please see Appendix B for a brief description of the stages of military training.

point often is sent back to a training facility for refresher training, incurring moving costs, per diem, and salary. The unit must try to do without the member while training proceeds. For the Navy, the number of sailors that can be working on a ship is limited by the number stationed at training between tours at sea.

If service members were given Skill Progression Training (SPT) at their unit rather than returning to a training center, moving, travel, and per diem costs could all be saved, and more services members would be "ready" with their units at any given time. The question now becomes, how can appropriate training be delivered to the service member at his or her unit at the proper time?

The Navy has begun to address this training requirement through its STEAM program, in which it distributes training CD-ROMs to ships once a year. If all services were to incorporate some type of SPT distributed learning, a substantial proportion of the 20 percent of service members continually in training could remain with their units and their families more.

Training courseware can be developed by the military, by commercial vendors, or by corporate training centers and civilian government agencies with similar interests. In fact, this development by all these participants is going on. For example, a series of public affairs officer courses developed with electronic media and available by correspondence has been developed by an office in the U.S. Army and Training Doctrine Command (TRADOC), with potential application to Navy, Marine, and Air Force public affairs officers. A CD-ROM course on security investigations developed by the FBI could be used by security officers in all services, if made available to them. A video course on blood safety and blood-borne pathogens developed commercially could be incorporated in institutional military health care training.

Advanced training media and electronic files may have been developed at great cost to assist in a training course. They could be used elsewhere for similar training if the applicable training authority knew of the existence of the media, if training planners could evaluate its value as a training aid, and if military training managers had the authority to access the media and make it part of a course curriculum. The challenge lies in discovering and organizing needs, identifying technology alternatives, and making the technology choices available to the services and service members needing those tools.

In Chapter 2, we discuss an effort that was already begun in order to determine convergent training needs and to identify distributed learning opportunities. The data collection and compilation effort described in Chapter 2 was a needed step to discover basic training priorities, and its accomplishment contributed to the formation of the Army Distance Learning Plan course conversion list. At the end of Chapter 2 and beginning of Chapter 3, we discuss the next steps that need to be taken to further encourage distributed learning and the steps to be taken to identify where distributed learning is most warranted.

Chapter 2
Building a Training Course Database

INITIAL COLLECTION OF DATA

The database that is discussed in this section should be considered complete, in that it can answer the questions it was compiled to answer. However, the database is like a house that has room for expansion: other closely connected arrays of information could be added that would allow the database to answer many more questions. This section provides an accounting of the capabilities of the database much as an architectural drawing would show the size and shape of a house's rooms. This description is useful to anyone considering building or expanding a database to answer military training questions. The database is also very large in relation to this report and cannot reasonably be appended. The complete answer to a single inquiry may run to 150 pages. Excerpts are provided throughout this section to illustrate the contents of some of the 20 related files that comprise the database.

LMI participated in a joint project with for the Office of Personnel and Readiness, RAND, and the Institute for Defense Analysis to collect schoolhouse training course data and produce a recommended "short list" of courses for consolidation with other institutional and distributed learning courses. The result of the joint project was incorporated into the annual Military Occupational and Training Data report, in its first index.[1]

Information was collected on current timing capabilities and characteristics. Course numbers, course titles, owning service, services taking the course, length of course, the military occupational usefulness of completing the course, the level of training offered in the course, consolidation of courses, contract or outsourced instruction, and use of technological courseware data was collected. We obtained files from each of the services describing the institutional training courses offered over the previous 3 years. Each service has different training priorities. The data available in each category varies because service-specific databases contain varying types of information.

Because the data fields were to be analyzed for grouping by subject matter, all occupational subject matter information available was requested. At least two files from each service were tendered. A single course might be listed in one, two, or

[1] Defense Manpower Data Center, Arlington, VA, *1995 Military Occupational and Training Data*, 1995.

all of a services' data files. In the case of the Marine Corps, many of the courses listed are offered by other services but are open to Marine Corps enrollment. Appendix A offers an extended discussion of the contents of the data files.

From the collected data, we constructed a database encompassing the services' and DoD's institutional skill training courses over 30,000 courses. Initially, we wanted to identify institutional training courses for conversion to distance learning conversion for consolidation. The database also was immediately useful for generating comparative and descriptive statistics about the vast field of military training.

USING THE DATABASE TO ANSWER TRAINING-ORIENTED QUESTIONS

Having developed "clusters" of similar courses across the services, the most promising clusters were evaluated with assistance from the Interservice Training and Requirements Organization (ITRO) so that recommendations for involving contract instruction and technology insertion could be made. (See Figure 2-1 for the health and environmental safety cluster.) Military occupations were ranked by the number of courses they used or required. Different training levels, called Military Manpower Training Requirements (MMTRs) were evaluated by LMI to determine where training efficiencies were most needed and could be applied. (The answer was the area of SPT.) As new issues and priorities arose, the data were queried to determine the number of flight courses, the number of progressive skill training courses, and similar questions of fact surrounding the armed forces training status.

One of the questions asked was where commonalties with private sector training needs would be found: the answer would provide P&R with starting points for military-industry training sharing. The database was developed further and crosswalks were developed to translate military occupations into civilian professions. The various military occupational identifiers had been translated by tables from the Defense Manpower Data Center (DMDC); these were supplemented with the Department of Labor's Standard Occupational Codes. Furthermore, occupational crosswalking was supplemented by subject content categorization on the logic that dissimilar occupations may share common skill sets and desire to share course materials.

Figure 2-1. Example of an Occupational Cluster

ENVIRONMENTAL HEALTH AND SAFETY SPECIALISTS

MOTDOCC	1473011	THROUGHPUT	
MANPOWER	4,500	ACCESSIONS	350

ALTERNATE TITLES

ENVIRONMENTAL HEALTH SPECIALISTS; ENVIRONMENTAL SCIENTISTS; AIR POLLUTION ANALYSTS; SOILS ANALYSTS; INDUSTRIAL HYGIENISTS; AIR QUALITY ANALYSTS; FOOD AND DRUG INSPECTORS; PUBLIC HEALTH INSPECTORS.

GENERAL DESCRIPTION

Each military base is a small community. The health and well-being of the residents and surrounding land is a major concern of the services. Keeping military work places and living areas sanitary helps to prevent illness. Environmental health and safety specialists inspect military facilities and food supplies for the presence of disease, germs, or other conditions hazardous to health and the environment.

WHAT THEY DO

Environmental health and safety specialists in the military perform some of all of the following duties:
Monitor storage, transportation, and disposal of hazardous waste;
Analyze food and water samples to ensure quality;
Conduct health and safety investigations of living quarters and base facilities;
Provide training on industrial hygiene, environmental health, and occupational health issues;
Monitor noise and radiation levels at job sites.

TRAINING PROVIDED

Job training consists of 11 to 19 weeks of classroom instruction, including practice in making health and sanitation inspections. Training length varies depending on specialty. Course content typically includes
Identification of health hazards;
Inspection of food products and food service operations;
Inspection of wastewater and waste disposal facilities;
Further training occurs on the job and through advanced courses.

CIVILIAN COUNTERPARTS

Most civilian environmental health and safety specialists work for local, state, and federal government agencies. Their duties are similar to the duties of military environmental health specialists. They may be called food and drug inspectors, public health inspectors, health and safety inspectors, or industrial hygienists.

Air Force

4B0X1	BIOENVIRONMENTAL ENGINEERING JOURNEYMAN
3E4X3	ENVIRONMENTAL JOURNEYMAN
4E0X1	PUBLIC HEALTH JOURNEYMAN

Navy

9595	HAZARDOUS MATERIAL CONTROL MANAGEMENT TECHNICIAN
8432	PREVENTIVE MEDICINE TECHNICIAN
9591	RADIOLOGICAL CONTROL MONITOR

Army

91S	PREVENTIVE MEDICINE SPECIALIST
91R	VETERINARY FOOD INSPECTION SPECIALIST

Marines

9954	HAZARDOUS MATERIAL/HAZARDOUS WASTE SPECIALIST
8033	QUALITY ASSURANCE TECHNCIAN (SUBSISTENCE)

COURSE TOPIC GROUPING METHODS

Interest in resource sharing between the military and commercial companies became an item for collaboration. The database was again utilized to help discover broad areas of commonality. Occupational matching was grouped and added to the database. (See Appendix C for occupational systems descriptions.) Additionally, because dissimilar occupations might have some convergent training interests, a course content matching capability was designed and implemented.

LMI investigated many existing methods for content categorization, including the following: the Dewey decimal system; university course numbering systems; the Library of Congress numbering system; the Department of Commerce's Standard Industrial Codes; the Office of Personnel Management's Knowledge, Skills, and Abilities; the United States Air Force Occupational Measurement Squadron's (AFOMS) Occupational Analysis Program; DoD contractor contributions to AFOMS; the Department of Labor's Occupational Information Networks (O*NET) content matrix;[2] and several custom-designed educational media categorizations published by the Department of Education.[3]

Requirements for a content categorization were derived on the basis of the functional needs of the database and the expected analyses. The categorization had to be numerically based or translatable to a number system to use in database format. The categorization had to be hierarchical rather than dictionary-based in order to find near matches as well as exact matches and allow the construction of broad groups for comparison and possible consolidation of courses by subject matter. The categorization had to encompass a broad subject matter: vocational training for the military, professional and university training for the growing service component of the military and the economy, and remedial (e.g., adult reading) and child education, two useful areas for the military. With the increasing demand to reuse electronic learning media, the categorization had to be applicable to whole study areas (e.g., degrees), courses, lessons, and learning aids (e.g., video clips). Finally, we wanted to use an existing system if possible to save time and improve its acceptance into use.

The International Standard Classification of Education (ISCED), devised by the United Nations Educational, Scientific, and Cultural Organization, seemed to best satisfy the requirements. The ISCED structure is described in detail in Appendix

[2] O*NET was at this point in time a placeholder. No draft categorization was available.

[3] Including, but not limited to the following: Far West Laboratory for Educational Research and Development, Berkeley, CA, *Rationale and Schedule for a Classification System for Education*, U.S. Department of Health, Education, and Welfare, 1972; Kellogg Foundation, *Kellogg Adult Education Thesaurus*, Battle Creek, MI., 1997; Office of Career Education, Policy Studies in Education, *Taxonomy and Profiles of Career Education*, New York, NY: Department of Health, Education and Welfare, 1997; United Nations Educational, Scientific, and Cultural Organization, *International Standard Classification of Education (ISCED)*, New York, NY: United Nations, 1973.

D, as well as the recommended ways to apply ISCED to course matching and electronic media reuse. Course content information is useful in recording and comparing lessons and distributed learning materials; it also promotes the substitution of technology for classroom time and encourages sharing of electronic resources, which will save money for developers.

Chapter 3
Projected Analyses of the Database: Capabilities

INFORMATION AVAILABLE NOW

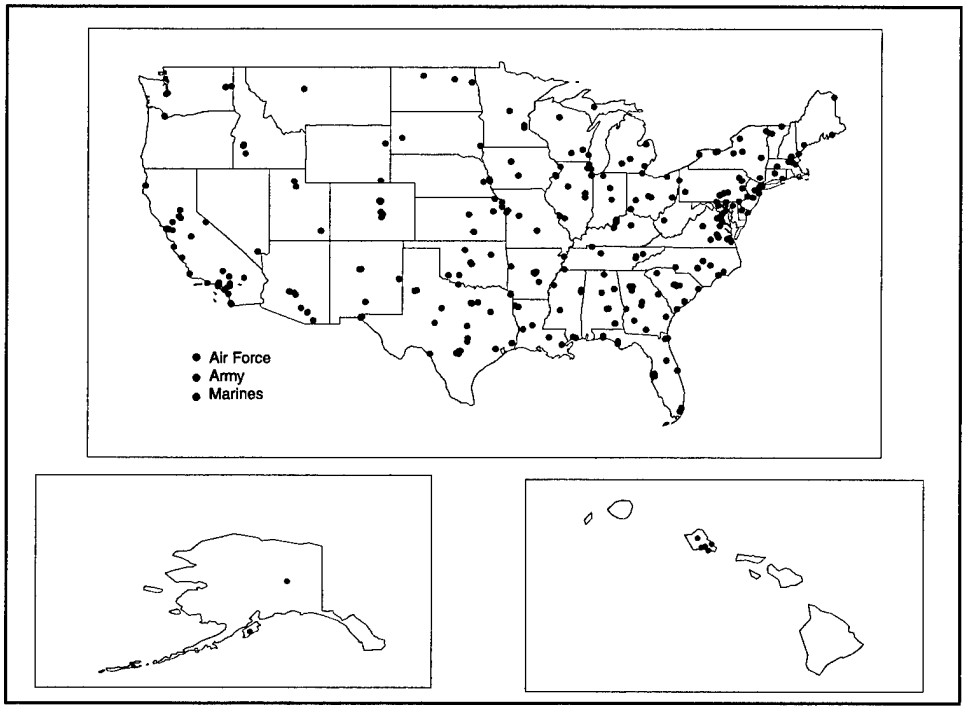
The above narrative should give the reader a pretty good indication of the separate fields available in the database, and thus guide questions that could be asked of it. The database already can provide some information to help decide where priorities lie. The database can describe the course subjects that are most frequently offered in schoolhouse training, in toto or by service. We can describe how geographically dispersed the training is by showing how many courses are offered, at which schools, and where those schools are located. (See Figure 3-1.) Using load information, we can describe roughly whether enlisted persons, officers, or other people comprise the majority of students by course subject matter. The database can reveal which courses are most often taken by pilots, by medical students, and by other career choices— and how long the coursework takes. In the current state of high utilization of certain military specialties such as pilots, this database could begin to answer ways in which to reduce pilot training and thus increase the availability of pilots for duty. As budget planners examine base realignment and closings, this database can help illustrate where alternative schoolhouse training is available and where it could be lacking.

INFORMATION THE DATABASE CAN PROVIDE AS IT MATURES

With some additional data collection and effort, there are some likely policy and budget questions the database could answer. Some information exists in the database showing training load figures from FY95 to FY97; but in other areas, only 1 year of information might have been provided. If training start dates and year-to-year loads were included, the database could be used to project the number of service members in training at any one time, how the load changes through the course of the year, and when the active force is most drained by training.

In preparing distributed learning courses, training planners should be concerned with the year-to-year trends for teaching particular subjects or courses, in order to know which courses are rising in demand and are good candidates for conversion. The same number of instructors could be used to teach the increasing number of students expected.

Figure 3-1. Locations of Military Training Schools by Service



If a distributed learning courseware database can be created with links to the schoolhouse training database, new opportunities for finding cost savings instantly present themselves. New courseware developers can be sent a list of the schools offering courses similar to one they may be developing. An analysis of the courses that are most instructor-intensive and those that do not convert well to distributed learning can be conducted. Tracking how distributed learning is implemented gives us a basis with which to estimate future personnel and budgetary requirements.

Existing distributed learning practitioners have noted that in the first year, distributed learning does not always pay for itself, but it has obvious readiness advantages that win the day for implementation. Return on investment for analysis needs to be conducted for distributed learning practitioners to answer questions like these: How many days are being reduced from the training schedule each year? How do distributed learning students test against traditional schoolhouse students? What is the best instructor-to-student ratio in distributed learning, and which topics need more attention than others? How long does it take for distributed learning to pay off? What payoffs can be expected in different fields? Does the retention rate in distributed learning courseware fall off after a period of time, and what does this imply for courseware refreshment rates?

It should be emphasized that return on investment is far from a simple matter when talking about course consolidation or conversion. In the institutional database, a simple query reveals a number of courses that all offer instruction in envi-

ronmental health and safety (see Table 3-1.) Many courses share the same course number or description. However, some are offered in geographically disparate locations and consolidating them by bringing students together would be more costly than holding 11 different classes. If a change is made in instruction that allows shorter classes, but the same number of instructors and same capital facilities are used, are there any savings? If an instructor develops computer-based instruction and 100 more people take the course each year than before, how should that be expressed monetarily? Many courses are also offered several times each year and are part of a series that make up a curriculum. If one course is consolidated or converted so that it can be taught once annually, there are arguably no savings since students must wait for an open slot in the next course in the series.

The major elements of information that senior managers need to know in planning distributed training are the cornerstone of the database. A significant amount of information has been compiled in this database, enabling it to answer several specific training-related questions: how much training goes on and where? with whom? to what end? With additional budget-related data, the database could be a powerful informational tool for P&R, answering real-time budget questions.

Table 3-1. Courses in Environmental Health and Safety

	Course ID	Title	MOTD Code	MOC/ NEC	MMTR Code	Course length, days
Air Force	X3ABR9S200	APPLIED SCIENCES	1473011	9S2X0	3A1	105
Air Force	J3ABR3E433	ENVIRONMENTAL APR	1473011	3E4X3	3A1	25
Air Force	L3AQR9S200	ELECTRONIC PRINCIPLES (EP)	1473011	9S2X0	3A1	62
Air Force	J4ART3E453	PEST MGMT SPLST (RECERT)	1473011		3A2	
Air Force	J5AZA4B071	RADIOLOGICAL SAFETY (4J-F3/494-F14)	1473011		3A2	
Air Force	J3AZR3E453	ENVIRONMENTAL MNGMT (CERTIFICATION)	1473011		3A2	
Air Force	J1ASC3E453	ENVIRONMENTAL/PEST MANAGEMENT TRANSITION	1473011		3A2	
Air Force	J3ARR3E453	MANAGEMENT JOURNEYMAN	1473011		3A2	
Air Force	J2AST3E453	MOBIL ENVIRONMENTAL TRANSITION	1473011		3A2	
Air Force	J5AZA4E071	SEXUALLY TRANS & OTHER COMM DISEASE INTERVENTION	1473011		3A2	
Air Force	J3AZR3E453	ENVIROMENTAL TRANSITION	1473011		3A2	
Air Force	J3AZR3E453	ENVIRONMENTAL MNGMT (CERTIFICATION)	1473011		3A2	
Air Force	J3ABR3E433	ENVIRONMENTAL APR	1473011		3A1	
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3A2B	5
Navy	A-322-2600	HMC&M TECH		9595	3B2B	5
Navy	A-322-2600	HMC&M TECH		9595		5
Army	321-91R10	Veterinary Food Inspection Specialist (Basic)	1473011		3A1	
Army	321-91R10	Veterinary Food Inspection Specialist (Basic) (RC)(PH 2)	1473011		3A1	
Army	322-91S10	Preventive Medicine Specialist	1473011		3A1	
Army	322-91S10	Preventive Medicine Specialist (RC)(PH 2)	1473011		3A1	
Army	6-8-C40(91R30)	AMEDD NCO Basic (NCOES)	1473011		3A2	
Army	6-8-C40(91S30)	AMEDD NCO Basic (NCOES)	1473011		3A2	
Army	321-91R10	Veterinary Food Inspection Specialist (Basic)		91R1	3A1	40
Army	321-91R10	Veterinary Food Inspection Specialist (Basic) (RC)		91R1	3A1	10
Army	6-8-C40(91R30)	AMEDD NCO Basic (NCOES)		91R3	3A2	71
Army	322-91S10	Preventive Medicine Specialist		91S1	3A1	75
Army	322-91S10	Preventive Medicine Specialist (RC)		91S1	3A1	10
Army	6-8-C40(91S30)	AMEDD NCO Basic (NCOES)		91S3	3A2	36

Chapter 4
Visions for the Future

DISTRIBUTED LEARNING DEVELOPMENT QUESTIONS NEEDING ANSWERS

Training managers today face the following issues:

- What are the opportunities for distributed learning, both today and in the near future?
- Which training programs can benefit the most from the use of distributed learning? Does that benefit involve cost reduction or more effective learning?
- What incentives are there to develop distributed learning?
- How much is the government spending on distributed learning technologies? Is this investment paying off?

This report discusses the work undertaken to begin to answer these questions. This paper outlines the structure of an information and analytical capability for training managers facing the tough choices of whether and where to invest in distributed learning training technologies. The development of a prototype information and analysis system is a key recommendation for subsequent research.

Other information that future research should address includes these questions:

- What kind of data do training managers need to make investment decisions?
- What data are available to answer their questions?
- What are the risks and how are they mitigated?
- How can we distribute the information DoD already has?

After training managers have identified the range of opportunities available to them, they then face the task of choosing the best technologies and options for their needs. Managers are expected to understand their training needs but may desire assistance in addressing investments in distance learning. For example, a typical new developer must answer these questions:

- Who will develop the courseware? Should we outsource?
- What media should we use? How much will it cost?
- What hardware facilities are available to support the technological courseware? Will we have to buy new equipment? How much will it cost over its lifetime?
- How will courseware be distributed or delivered?
- When should courseware be updated?
- What is the degree of instruction intervention with this courseware? Does it make the instructor's job easier or harder?
- How do we measure if the technology is effective? Will the students learn the material?
- How much will we really save?
- If we reach more students, what next?

These issues should be addressed in future research, which is laid out more fully in the section entitled Next Steps.

ASSESSING TECHNOLOGY INSERTION PAYBACK

How much of an improvement can be expected from technology infusion over traditional methods? What is the true payback of technology use in training? Technological media is expensive to create, and accounting payback analyses show that few course conversions will pay for themselves. These analyses fail to capture all of the benefits of course conversion due to the lack of measurement in improvement of human capital.

Cost savings studies show that technology insertion is accompanied by a decrease in instruction hours.[1] Concurrently, a single instructor has greater availability to a larger number of students. Typically, the distributed learning instructor can

[1] See *Evaluation of Pilot Distance Learning Course,* Operational Training Unit, National Security Division, Federal Bureau of Investigation, June 1997.

instruct four times as many students as an instructor who can use only schoolhouse instruction. Traditional payback analyses measure the decrease in class time, the savings in student and instructor salaries or value of time, travel time, administrative costs, and processing costs. These figures are all fairly concrete and agreeable measurements. But experience also shows that technology insertion in the classroom increases student participation, absorption level, and retention rates. Students learn the material better, score better on comparative tests, and retain the material longer. The improvements observed in technology-assisted courses are similar to the results seen with individual tutoring. We will attempt to quantify the training effectiveness improvements implied in this better result; it is the student's payback.

In studying training effectiveness, we also will be developing payback analyses that can be used not only for evaluating the implementation of distributed learning technologies but also for ascribing cost-sharing arrangements when two agencies, or an agency and a private company, agree to develop a course together for mutual use.

RECOMMENDATIONS FOR CONTINUED COURSE TECHNOLOGY INTEGRATION

Growth of the Database

This task initially began as an analysis and databasing of institutional training classes to determine those courses ripe for consolidation or comparison with Army distance learning courses with close comparisons. The population for comparison has expanded beyond the Army to all the services, other agencies, and commercial courses. Additionally, the comparison has grown from matching similar courses to matching lessons and parts of lessons, especially those involving the use of expensive technological media. Sharing learning media requires identifying and cataloging course media.

Distance Learning Data

The course database should be expanded to include existing DoD distributed learning courseware, to capture both lessons learned and opportunities for media reuse. A great number of DoD service members already have prepared distributed learning courses and media, and the group grows continuously. The growth of technology courseware is so fast in fact that other distributed learning practitioners are unaware of resources that may be available for sharing and reuse. Traditional database and publishing methods for publicizing courseware will always lag well behind the actual course availability.

Courseware Information Resources Now

The Defense Instructional Technology Information System (DITIS) maintains a formal database of distributed learning information and has information standards and an established republishing cycle. Formal standards for media and course categorization, storage, and sharing are being discussed in the Advanced Distributed Learning Forum. The formal standardization process is necessary but delays by months or years the dissemination of course information that may have a shelf life of only 3 years.

Additionally, many service members and distributed learning developers have mentioned that they wished they had access to information about the scope of training in DoD. When writing a course for their unit (for example, a repair refresher course), it would be useful to know how many service members complete basic repair courses each year and might want to use the refresher in the future, or that another unit already had developed such a tool.

To redress the problem of immediately being able to locate distributed learning reuse opportunities in DoD, a self-subscribing Web page should be established. A database loaded onto the World Wide Web can be automatically updated with an electronic submittal form sent by e-mail. People with access to the Internet would merely need to fill out a template with service affiliation, course number, length, types of instruction, course content or keywords, price of access (if any), and point-of-contact information and e-mail it to an automatic server. Text-recognition facsimile submission provides an effective substitute for those who are "Internet deprived", and any corrections can be pointed out via e-mail for a human operator to incorporate.

This modest proposal would provide a bare-bones forum for finding available distributed learning and technology-enhanced instruction. When all the issues for content classification have been ironed out, a basic list of courseware will be waiting for application.

NEXT STEPS

A summary of the requirements set out above must encompass, first and foremost, the building of an interactive information tool. An interactive Web page must be launched; simultaneously a distributed learning database will begin to be established.

The Advanced Distributed Learning Forum will work with DoD and industry participants to flesh out content definitions—those given here are not definitive and do not represent an accepted standard; they are only the product of a research program.

KEY ELEMENTS OF A DISTRIBUTED LEARNING INFORMATION AND ANALYSIS SYSTEM

The proposed interactive page and DoD distributed learning database provide a good foothold for bringing together practitioners to answer the questions outlined in the Distributed Learning Development Questions Needing Answers section above. A natural extension of the utility and the next step that developers will need will be the development and analysis of information about courses that will help managers make good business decisions.

LMI plans to begin collecting data on Web course instruction costs, visit "corporate universities," and begin researching distributed learning effectiveness to develop information databases and simple models for managers to access. At its most basic, the research will provide answers to "how much will it cost?" and "how much will my department save?" But such research is also fundamental to solving the following problems:

- If tutoring improves average learning performance by two standard deviations, how much does distributed learning improve average performance? What causes the difference? Is it robust over time?

- If my department and another civilian agency develop a course together, how do we decide how much each should pay in acquisition and life-cycle costs?

In summary, an electronic forum would offer the distributed learning community a place to share courseware and media, learn about implementation, discover the financial information needed to launch a distributed learning project, and research the methods for creating electronic media. It may also provide the beginnings of collaboration for DoD and civilian, private, and corporate training managers, and scholarly work on how training is effective.

Appendix A
Training Database

The database currently consists of 14 files. For each service, there is an index of course numbers with Military Manpower Training Requirement(MMTRs) and, often, the course title. Each service has several files with varying information, but each generally contains at a minimum, course identification numbers, course title, MMTR code (indicates level of training), the service "owning" the course, and services taking the course. In many cases, data also are available on the number of students enrolled in the course; when and where (school code) the course was offered; whether the course was offered through a contractor, was outsourced, or used computer-based instruction; how many students enrolled and graduated the course in each of the past 2 years; the occupational specialty represented; and course content. Additionally, several files that translate occupational codes from Military Occupational Codes (MOCs) to Military Occupational and Training Data (MOTD) to Standard Occupational Classification (SOC) are considered part of the accumulated database capability.

Often, the same course is listed more than once; if offered in a different location or to a different audience, sometimes the course is renamed and given a new course number. Some duplicate "different location but same course" records exist in LMI's database of schoolhouse training, but they are relatively easy to sort out if needed. Each service has its own identification number for its courses, even those offered by another service; so, if a Marine recruit takes an Army course, there will likely be two listings of the same course with two different course identification numbers. This double-counting across services as yet has not been remedied, though comparison of course title and content would turn up several of them. Including the duplicates noted above, approximately 18,332 courses are in the database. (See Table A-1.)

Table A-1. Breakout of Military Courses by Skill Training Category

	Number Of Unique Courses			
Service	Total	Recruit, OSUT, officer training	IST, SPT, and flight training	University education
Army	5,551	819	4,543	184
Air Force	6,657	0	6,566	35
Marine Corps	1,562	0	1,231	97
Navy	2,527	10	2,440	3

It should be noted that at this point, the data in this database is 2 years old and may be incomplete. It cannot be assumed that it encompasses all military schoolhouse training courses, though every method to include all possible courses has been made, given the time and materials available.

The database includes variables likely to support analytical requirements in budget and policy decision-making, such as load, training level, service owning the course, services participating in the course, technology insertion, contracting status and co-location. Training data in this database was collected initially by each service in support of staffing planning requirements.

Fifty-five percent of courses listed in the military schoolhouse class database have some sort of occupational identifier, ranging from a high of 99.7 percent for Army courses to a low of 7 percent for Marine Corps courses.

Appendix B
Overview of Traditional Military Training

Military training follows a general sequence that is common across all services. Upon call-up, recruits, or enlisted personnel, are given a physical and sent to recruit training. Often called "boot camp," recruit training indoctrinates enlistees in the procedures and regimen of military life. Recruits receive combat training, fitness training, and begin to receive service-specific information. Recruit training is conducted by each service in specified locations; for example, the Marine Corps trains recruits only at Parris Island and San Diego. (See Table B-1.) Following recruit training, about half of Navy recruits and a small percentage of other services' recruits are sent to their units; the rest begin specialized skill training, beginning with Initial Skill Training (IST). IST consists of apprentice-level occupational training and can last from 3 to 52 weeks, but averages 7.5 weeks. The Army offers IST at the same site as recruit training in about half their training facilities, a practice called One Station Unit Training (OSUT). After IST, most recruits then go to their units, though some receive additional training.

Table B-1. Recruit/Basic Training

Service	Training type	School location	Weeks of training
Air Force		Lackland AFB, TX	6
Marine Corps		San Diego, CA (men only)	11
Marine Corps		Parris Island, SC	12
Navy		Great Lakes School, IL	9
Army	Combat only	Ft. Knox, KY	8
Army	Combat only	Ft. Sill, OK	8
Army	Combat only	Ft. Leonard Wood, MO	8
Army	Combat only	Ft. Jackson, SC	8
Army	Combat + IST (OSUT)	Ft. Knox, KY	11+
Army	Combat + IST (OSUT)	Ft. Sill, OK	11+
Army	Combat + IST (OSUT)	Ft. Leonard Wood, MO	11+
Army	Combat + IST (OSUT)	Ft. Benning, GA	11+
Army	Combat + IST (OSUT)	Ft. McClellan, AL	11+

After a period of time with their units, depending on unit occupational staffing needs and term of service, some percentage of enlisted personnel are sent on travel or temporary tour of duties to training facilities for SPT.

SPT courses may hold the highest return on investment for conversion to distributed learning, since SPT usually involves traveling from the enlistee's regular unit to a distant location. Pilots and flight officers receive a separate regimen of training, consisting of undergraduate flight training, flight familiarization training, advanced flight training, and other flight training. Professional development education is also tracked by DoD. DoD subsidizes education at professional military schools and universities, predominantly legal education, health professions education, undergraduate education, and graduate education. Officers in all services receive precommissioning training, also called Officer Acquisition Training (OAT).

Most military-funded educational (university) courses are omitted from military training course rosters for a variety of reasons. Military service members attend civilian universities, so the spectrum of available courses is too broad to be worth recording in a database; and these courses are not owned by any service or DoD.

Appendix C
Samples of Occupational Crosswalks

OCCUPATIONAL CODES

Most military services categorize their courses and positions by occupational groups. The exception is the Marine Corps; most of its courses currently are not mapped to occupational groups. Several categorization schemes are used; the major ones are Military Occupational and Training Data (MOTDs) Occupational Employment Statistics/Dictionary of Titles (OES/DOTs), and Standard Occupational Classification (SOCs) and Military Occupational Codes (MOCs). Each classification scheme is described briefly below.

The MOTDs categorization, organized by the Defense Manpower Data Center (DMDC), consists of 7-digit numerical codes, called MOTDs or MOTDOCCs (MOTD Occupational Codes). A total of 152 MOTD specialties apply to military personnel, grouped into 11 broad categories. Generally, the last digit of the 7-digit code indicates whether the occupation is filled by enlisted personnel or officers.

The OES/DOT was a classification system used by the Department of Labor (DOL). The 185 OES codes were five numerical digits in length, and did not match well with MOTDs. Several MOTDs could fall under one OES while some MOTDs fell under multiple OESs. DOT/OES is no longer used by DOL; it has been replaced with the SOC.

The SOC formerly consisted of two to four digits depending on the level of detail of classification desired; in 1997 a major revision was begun and all codes will be about six digits in length. In the 1997 SOC there are 22 "major groups" of occupations, around 100 "minor groups" that correspond well with MOTDs, then hundreds of "broad occupations" and even more "detailed occupations." An illustration of the 1997 SOC follows:

17-0000 ARCHITECTURE AND ENGINEERING OCCUPATIONS (Major Group)

17-2000 ENGINEERS (Minor Group)

17-2010 ELECTRICAL AND ELECTRONICS ENGINEERS (Broad Occupation)

17-2011 ELECTRICAL ENGINEERS (Detailed Occupation)

MOCs are widely used and difficult to explain.[1] The MOCs have anywhere from two to nine digits, numbers and characters, and they represent very generalized to very specialized occupational titles. MOCs are amalgamated from every service's own occupational codes, including the Army's Military Occupational Specialty (MOS), Air Force Specialty Codes (AFSCs), Navy Officer Billet Classifications (NOBCs), and Navy Enlisted Classifications(NECs). Within a service's occupational classification, there are subcategories such as Area of Concentration (AOC), Additional Skill Identifier (ASI), and Special Qualification Identifier (SQI); each corresponds to a smaller number of digits within the larger code.

Each service uses a different set of MOCs, sometimes using different codes for the same title. MOCs are meant to be fairly detailed descriptions and often 20 or more MOCs will correspond to one MOTD. For example, an Army Administrative Assistant (MOC 71L), a Marine Personnel Clerk (0121), a Marine Legal Services Specialist (4421), and a Navy Legalman Second Class (LN), all fit under the MOTD 4630991 for Administrative Support Specialists.

Military Occupational Specialty (MOS) codes were established by the Army, and after some period of use., the services adopted modified versions of the Army's MOS. Some modifications were extreme, and the codes continue to shift over time. Air Force Specialty Codes (AFSC) were developed in 1951, revised in 1993, and correspond to only nine career groups. AFSCs have a different number of digits for officers and enlisted personnel. The Navy has two separate code groups, the NOBCs and NECs, for officers and enlistees.

[1] The Defense Manpower Data Center (DMDC) tracks these codes and regularly updates them. For translation services, contact the DMDC. John Fowlkes of the DMDC-East has prepared a concise and understandable six-page summary of the derivation of MOC codes, an excellent reference.

Appendix D
Content Definitions

CONTENT CLASSIFICATION

Content classification may be used in two ways: to compare plans of instruction and to sort and identify technological learning media. A general scheme was referred to in the main text that will be expanded upon below. Full use of the International Standard Classification of Education (ISCED) scheme will likely involve the addition of a keyword system to create fuller levels of detail. A keyword system seems inescapable in detailed media classification due to the possible content variety. Numbers are not recommended since they are nonmnemonic, and the general grouping that numbering would accomplish has already been addressed at the ISCED level.

To illustrate the possible use of ISCED and keyword classification, consider the example of an instructor writing a course in operations research. The instructor wishes to access electronic media items related to "queuing theory." The instructor will first narrow his search to the ISCED category of "math and computer science," and then search for other courses or for electronic media under specific headings, such as "queuing theory." If the courseware preparer is unable to think of appropriate keywords, he or she should be able to look up queuing theory in the synonym dictionary and find the appropriate keywords, which may be "delay models."

Keywords are also used to prevent classified items from falling into oblivion. The first impulse of contributors to the reusable electronic media database may be to use words such as "highway traffic congestion simulation," "modified Monte Carlo analysis," "C++ program," and "client-server optimization strategies," so media should be classed in established topic areas, like "delay model," to increase the items' visibility. As classification is taken to finer and finer gradations, the possibility of reuse is greater, but at the price of a concomitant increase in administrative effort. For example, a portfolio of medical illustrations may be classed as "various medical illustrations," but the media will be more accessible if more specific descriptors are applied, such as "illustrations of muscle groups" and "illustrations of joints of the body."

These classification recommendations are the product of a research effort and are proposed to encourage the development of classification systems in the distributed learning field. While the ISCED is fairly complete, the keyword dictionary has been left undeveloped and general recommendations are made about its construction, since the idea of using a keyword dictionary has yet to be widely reviewed.

OTHER MEDIA CATEGORIZATION NEEDS

Guidelines are needed in electronic media to encourage reuse of categorized items. Courseware developers will not try to reuse categorized media if the items are unusable due to inappropriate size or platform constraints. A key issue at the time of this writing is, what is the size of an electronic media item? Is a media item a video clip, a scanned photo or diagram, or a 3-hour interactive computer course? If our goal is to encourage deposits and reuse in the media marketplace, then the answer must be: a size that is convenient to the developer and to the user. Furthermore, standards for electronic files must be established; requiring use of the hypertext markup language (i.e., HTML) language is an example. These issues are raised only as issues recommended for resolution when categorizing items by content.

The U.S. Department of Education recommends classifying educational aids by the following six categories.[1] Subcategorical descriptors are drawn from the Department of Education or from ISCED, as noted.

1. Title or brief description of material
2. Source and date of material
3. Educational level; the following two alternative systems are available:

DoE	ISCED
Preschool	0 = preceding first level (ages 3–5)
Early elementary (ages 5–7)	1 = education at the first level (ages 5–11; also remedial learning)
Upper elementary (ages 8–12)	2 = education at the second level, first stage (ages 11–13)
Junior/middle (ages 12–14)	3 = education at the second level, second stage (ages 14–16)
Senior (ages 15–17)	5 = education at the third level, first stage, non-university degree (ages 17+; associates degrees and trade training)
Post secondary	6 = education at the third level, first stage, university degree
Adult	7 = education at the third level, second stage; post graduate work
	9 = education not definable by level: seminars, recreation, professional skills

[1] Office of Career Education, Department of Health, Education and Welfare, *A Classification Scheme for Career Education Resource Materials*, Washington, D.C.: GPO, June 1975, p. 14.

Categories are drawn from "A Classification Scheme..." but subcategories have been edited for social and technological change.

4. Discipline and content area (see ISCED schedule, below)

5. Special audience

   - Specific language
   - Braille
   - Large type
   - etc.

6. Type of material

   - Tools and related items
   - Games
   - Puzzles
   - Activity kits
   - Videotapes
   - Transparencies/Vu-graphs
   - Slides
   - Records/audio tapes
   - Films (various sizes)
   - Textbook
   - Teacher's guide
   - Student workbook
   - Simulation, computer-based
   - Simulation, desk-based
   - Laboratory practice
   - Evaluation practice (quizzes and exams)
   - Bibliography
   - Directory
   - Look-up tables
   - Administrative material
   - Photos
   - Audio CD
   - Film CD
   - Text CD/CD-ROM
   - Interactive CD
   - Physical demonstration model (e.g., medical mannequin)
   - Electronic files, various formats
   - Virtual reality device
   - etc.

COURSE MATCHING

Courses need to be matched to each other by subject so that distributed learning courses can be accessed by trainers in the same field. Additionally, courseware preparers who are searching for preexisting media to use must be able to find media by subject. Thus, for courseware classification, a multilayer system also is proposed, beginning with the ISCED subject fields then use of a keyword structure and dictionary. That system looks like this:

- Proposed layers
  - Subject matter field (one of 20 choices)
  - Course subject (one or more of 500 choices)
  - Course objectives by keywords (several words from keyword dictionary)
- ISCED subject fields
  - 01–10 = K–12 fields
  - 14 = teacher training
  - 18 = fine and applied arts
  - 22 = humanities
  - 26 = religion and theology
  - 30 = social and behavioral science
  - 34 = commercial and business administration
  - 38 = law and jurisprudence
  - 42 = natural science
  - 46 = math and computer science
  - 50 = medical and paramedical
  - 54 = engineering
  - 58 = architecture and town planning
  - 62 = agriculture, forestry, fishery

- 66 = home economics and domestic science
- 70 = transport and communication
- 74 = trade, craft, and industrial
- 80 = programs for the handicapped
- 99 = other
- 48 = space
- 76 = weapons

APPLICATION OF ISCED TO MILITARY TRAINING DATA

The training database contains limited course content information from the Army Training Requirements and Resources System (ATRRS). Course content information is useful in recording and comparing lessons and distributed learning materials; it promotes the substitution of technology for classroom time and encourages sharing of electronic resources. It is anticipated that additional content information, if needed, could be collected from the Army through ATRRS-Total Army Centralized Individual Training Solicitation (TACITS); from the Navy (Pensacola); Air Force (Randolph AFB); and from the Marine Corps (Quantico).

In the existing database, content matching may enable whole courses to be shared. Even without an occupational definition, content matching enables identification of courses with common training objectives, such as wheeled vehicle maintenance in the Army and vehicle maintenance training by General Motors Corporation.

Once a market for electronic media is established, the content schema can be used to identify electronic media for reuse. For example, a computer-generated graphic of storm cloud development may get reuse in related meteorology courses and in flight training. The electronic media "marketplace" may be established as a linked part of the DoD training database or in a new incarnation, perhaps in a distributed netware Internet site.

Appendix E
DoD Distributed Learning Points of Contact

This appendix lists points of contact in DoD for already-developed distributed learning courses. It is a preliminary list. Following the DoD distance learning course contact list are DoD distributed learning universities, points of contact for already-developed civilian government courses, DoD distributed learning web link sites, and potential sources of technological media.

DoD Distributed Learning Courses

- Intranet-based course on Army warfare strategy

  Luciano Iorizzo, Jr.
  Technical Advisor, USAARMC
  ATSB-DL, Bldg 2369, Fort Knox, KY, 40121-5200
  iorizzol@ftknox-dtdd-emh5.army.mil

- Internet courses

  Offered free. Subjects: Acquisition Reform, Safety, Education, Technical Training, Communication Skills, Organization Skills, Management, Career/Personal Development, EEO, Macintosh Skills

  Marilyn Newman
  Training Specialist
  AEGIS Training and Readiness Center
  5396 First St.
  Dahlgren, VA 22448-5200
  Marilyn_Newman.at.AEGIS-TRACEN@hq.navsea.navy.mil

- CD-ROM officer/leadership course

  MSgt Leslie E. Amidon, BGS and MSgt Frank A. Mileto, B.S.
  Interactive Courseware Instructional Designers
  550 McDonald St.
  Maxwell Air Force Base
  Gunter Annex, AL 36114-3107
  http://www.au.af.mil/au/cepme/college.htm

- CD-ROMs: Shipboard Training Enhancement Program (STEP); offers a wide variety of topics including Global Positioning Satellite System, Cor-

rosion Control, Cooking, Lookout Training, Pump Maintenance. STEP is one of many such programs offered by the Navy.

www.cnet.navy.mil/netpdtc/step/

- Teleconferencing courses

  Public Affairs Officer Training
  Edith Alexander, Ph.D.
  American Forces Information Service
  Office of the Assistant Secretary of Defense (Public Affairs)
  Directorate of Training
  601 N. Fairfax Street
  Alexandria, VA 22314-2007
  eealexa@hq.afis.osd.mil

- A variety of materials are available for training and refreshment on acquisition including Web files, video tapes, and recordings.

  Acquisition Reform Resource Center learning materials

  http://afmc.wpafb.af.mil/organizations/HQ-AFMC/DP/dpe/lb-9/arrc.html

- Correspondence courses on logistics, personnel retention, supervision, mobilization, alcohol and drug abuse by the Army Readiness Reserve Training Center.

  http://host.Id.centuryinter.net/arrtc/decentrl.html

DoD Distributed Learning Universities

- Air University

  Courses are available in Civil Air Patrol, Military Education, Officer Training, Air Strategy, Aerospace Doctrine and Research, Air Force Judge Advocates, Military Comptroller, Chaplain Service, First Sergeant Academy, Historian Development, etc.; offered via Web or CD-ROM.

  http://www-acsc.au.af.mil

- Defense Acquisition University

  Courses for acquisition officers
  http://www.acq.osd.mil/dau/dau.html

- Naval Postgraduate School

  M.S.E.E., Electrical and Computer Engineering
  Prof. Gerry Thierren
  Department of Electrical and Computer Engineering
  Naval Postgraduate School, Monterey, California 93943
  http://vislab-www.nps.navy.mil/~mtummala/distlearn/distance.html

- National Defense University

  A number of colleges at NDU offer distributed learning
  http://www.ndu.edu/homepage/html/

CIVILIAN GOVERNMENT AGENCIES' DISTRIBUTED LEARNING PROGRAMS

- CD-ROM Basic Security Course, converted from institutional training.

  Patricia M. Boord
  Curriculum & Interactive Training Technologies Program Manager
  National Security Training
  FBI Academy
  Quantico, VA 22135

- Interactive Continuing Medical Education

  Birmingham Veterans Affairs Medical Center is installing a T-1 based video teleconferencing system that will link primary care providers at all VAMCs in the state of Alabama. Video teleconferencing equipment will be placed in the treatment areas of the hospitals for consults with specialists.

  Tom Nielsen, Ed.D.
  Associate Director
  Birmingham Regional Medical Education Center
  Medical Forum Suite 500
  950 North 22nd Street
  Birmingham, AL 35203
  nielsentom@lrn.va.gov
  Also see http://www.va.gov/mediauto/telemed for similar initiatives in all states.

- Distributed Learning for Emergency Medical Service Technicians

Garry B. Criddle, R.N., CDR., USCG/US PHS
Emergency Medical Services Specialist
Executive Secretary MAST
U.S. Department of Transportation
National Highway Traffic Safety Administration
400 7th Street, S.W. (NTS-42)
Washington, D.C. 20590
Gcriddle@NHTSA.DOT.GOV

DoD Distributed Learning Web Sites

- http://www.atsc-army.org/
- http://www..ngbs..ngb.army.mil/.tng/Arsites.htm#dod
- http://www.ott.navy.mil (Chief of Naval Operations Office of Training Technology, Seamless Product Information Data Exchange and Repository)
- http://atscweb.atsc-army.org/accp/aipd.htm (Army Training Support Center)
- www.dcst.monroe.army.mil/adlp/wbt-1.htm (Status Report on Use of the Internet and World Wide Web for delivery of Army Distributed Learning, developed by Training Development Analysis Activity Headquarters, U.S. Army Training and Doctrine Command, Fort Monroe, VA)

DoD Audio-Visual and Broadcasting Materials

- http://www.defenselink.mil/afis/index.html#tasa (American Forces Information Service)
- http://michp753.redstone.army.mil/davis/ (Defense Automated Visual Information System)
- www.dmdc.osd.mil/ditis/ (Defense Instructional Technology Information System (DITIS) database to facilitate resource sharing within DoD and reduce costs associated with redundant interactive courseware (ICW) development.)
- http://xenon.brooks.af.mil/ HSC/AL/SD/SDS.html (Technical Visual Services provides professional and artistic support, management, and products in all presentation mediums for scientific, medical, and educational programs and missions at the Armstrong Laboratory, Human Systems Center, and other DoD organizations such as the Armed Forces Institute of Pathology. Mediums pro-

duced include television, photography, illustrations, video teleconferencing, and audio visuals.)

Appendix F
Abbreviations

ADLP	Army Distance Learning Plan
AFB	Air Force Base
AFOMS	United States Air Force Occupational Measurement Squadron
AFSC	Air Force Specialty Codes
AOC	Area of Concentration
ASI	Additional Skill Identifier
ATRRS	Army Training Requirements and Resources System
ATSC	Army Training Support Center
CD	compact disk
CD-ROM	compact disk—read only memory
DAU	Defense Acquisition University
DISN	Defense Information System Network
DITIS	Defense Instructional Technology Information System
DMDC	Defense Manpower Data Center
DoD	Department of Defense
DoE	Department of Education
DoL	Department of Labor
DOT	Dictionary of Titles
EEO	Equal Employment Opportunity
FBI	Federal Bureau of Investigation
Ft	Fort
GPO	General Printing Office
HTML	hypertext mark up language
ICW	Interactive Courseware
ISCED	International Standard Classification of Education
IST	Initial Skill Training

ITRO	Interservice Training and Requirements Organization
KSA	Knowledge, Skills, and Abilities
MMTR	Military Manpower Training Requirements
MOC	Military Occupational Codes
MOS	Military Occupational Specialty
MOTD	Military Occupational and Training Data
MOTDOCC	Military Occupational and Training Data Occupational Codes
NDU	National Defense University
NEC	Navy Enlisted Classifications
NICNAC	Navy Interactive Courseware Novice Authoring Course
NOBC	Navy Officer Billet Classifications
O*NET	Occupational Information Network
OAP	Occupational Analysis Program
OAT	Officer Acquisition Training
OES	Occupational Employment Statistics
OPM	Office of Personnel Management
OSUT	One Station Unit Training
P&R	Personnel and Readiness
PACE	Programs for Afloat College Education
R-Net	Army Reserve Network
ROI	return on investment
SIC	Standard Industrial Codes
SOC	Standard Occupational Codes
SPIDER	Seamless Product Information Data Exchange and Repository
SPT	Skill Progression Training
SQI	Special Qualification Identifier
STEAM	Shipboard Training Education Advancement Morale
STEP	Shipboard Training Enhancement Program
TACITS	Total Army Centralized Individual Training Solicitation
TRADOC	U.S. Army and Training Doctrine Command

UNESCO	United Nations Educational, Scientific, and Cultural Organization
USAARMC	United States Army Armor Center
USD[P&R]	Under Secretary of Defense for Personnel and Readiness
VAMC	Veteran's Affairs Medical Center

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LMI created a relational database to examine institutional training issues with an emphasis on converting classroom training to distributed learning courses. The database was used to cluster "schoolhouse" courses to identify subject groups for possible consolidation and to identify the courses promising the highest return if converted to distributed learning. Distributed learning course conversion requirements are outlined and conversion issues highlighted. A framework for incorporating data about distributed learning courseware into the existing training database was devised and a plan for a national electronic courseware redistribution network was recommended. (Electronic courseware is software that enables distributed learning.) The report describes information now available in the institutional training database, potential benefits of distributed learning conversion, and difficulties in assessing return on investment from the conversion. Military training stages, courseware classification schemes by content and occupation, and existing military distributed learning practitioners are also described.

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